improve the dimensional accuracy of the article, and decrease the material loss due to the production of parts by cutting.

A further object of the present invention is to provide a method for producing the molded article of a modified PTFE by joining, which includes simplified operations to join the parts of a modified PTFE, and greatly improves the productivity, particularly in the mass production.

Accordingly, the present invention provides a method for producing the molded article of a modified PTFE by joining comprising the steps of:

providing at least two premolded parts of modified PTFEs having different coefficients of thermal shrinkage with allowing their joining faces to be in contact each other or to be closely placed, and

sintering the parts to join them at the joining faces.

In one preferred embodiment, the joining of the parts at their joining faces is carried out without the application of an external pressure.

In general, a premolded part has a coefficient of thermal shrinkage in the range between 0.2 and 10 %, and the difference of the coefficient of thermal shrinkage is from 0.2 to 9.8 % between two premolded parts which are adjacently placed.

In other preferred embodiment, at least one premolded part is surrounded by another premolded part having a larger coefficient of thermal shrinkage than that of at least one premolded part.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a graph showing the relationship of a premolding

pressure and a coefficient of shrinkage of the outer diameter of tubular premolded parts of the modified PTFEs having different particles sizes, which are used in Example 1.

Fig. 2 is a graph showing the relationship of a premolding pressure and a coefficient of shrinkage of the outer diameter of the tubular premolded parts of modified PTFE, which is used in Example 2.

Fig. 3 is a graph showing the relationship of a premolding pressure and a coefficient of shrinkage of the outer diameter of the premolded parts of modified PTFEs having different particles sizes, which are used in Example 3.

Fig. 4 is a graph showing the relationship of a premolding pressure and a coefficient of shrinkage of the outer diameter of the premolded parts of modified PTFEs having different particles sizes, which are used in Example 4.

Fig. 5 is a graph showing the relationship of a premolding pressure and an outer-diameter shrinkage factor of the premolded parts of modified PTFEs having different particles sizes, which are used in Example 5.

DETAIELD DESCRIPTION OF THE INVENTION

The term "modified PTFE" intends to mean a copolymer of tetrafluoroethylene and a small amount of one or more of the following modifier monomers.

Examples of the modifier monomers for PTFE include fluorine-containing unsaturated monomers other than TFE, such as a fluoroalkyl vinyl ether of the formula:

$$X(CF_2)_nOCF=CF_2$$

wherein X is a hydrogen atom, a fluorine atom or a chlorine atom,

and n is an integer of 1 to 6, or the formula:

$$C_3F_7(OCF_2CF_2CF_2)_m[OCF(CF_3)CF_2]_lOCF=CF_2$$

wherein m and l are each an integer of 0 to 4, provided that they are not 0 (zero) at the same time;

$CF_3-CF=CF_2$, $CF_2=CFH$, $CF_2=CFCl$, $CF_2=CH_2$; an unsaturated compound of the formula:

$$RfCY=CH_2$$

wherein Rf is a linear or branched polyfluoroalkyl group having 3 to 21 carbon atoms, and Y is a hydrogen atom or a fluorine atom; and the like.

Such a modifier monomer is usually used in an amount of 0.01 to 1.0 wt. % of the weight of TFE.

In the present invention, modified PTFE can be used in the form of an as-polymerized powder, or in the form of granules which are obtained by granulating such a powder. Herein, the powders and granules of modified PTFE are collectively called "modified PTFE powder".

Furthermore, it is possible to disperse suitable amounts of various fillers in a modified PTFE powder. Examples of such fillers are glass fiber, graphite fiber, carbon fiber, bronze powder, etc. In addition, other conventional additives may be compounded in a modified PTFE powder.

The method of the present invention is particularly useful to produce a molded article in which one part (first part) surrounds the other part (second part), for example, a container having a bottom and a sidewall surrounding the bottom, an article having a solid or hollow cylindrical body and a flange surrounding such a body, etc.

Typical methods are explained. For example, parts having different coefficients of thermal shrinkage can be obtained by separately premolding two or more modified PTFE powders having the same molecular weight but different particle sizes under the same conditions. In general, a premolded part has a smaller coefficient of thermal shrinkage, as a particle size of a modified PTFE powder is made larger.

Sub B5 Two ore more premolded parts having different coefficients of thermal shrinkage can be obtained by premolding the same modified PTFE powder under different pressures. In general, a premolded part has a smaller coefficient of thermal shrinkage, as a pressure is higher.

Alternatively, premolded parts of modified PTFE having different coefficient of thermal shrinkage can be obtained under the same premolding conditions from an as-polymerized modified PTFE powder, and a granulated product of such a modified PTFE powder. In general, a premolded part made from the granulated product has a smaller coefficient of thermal shrinkage than one made from the ungranulated modified PTFE powder.

Herein, "a coefficient of thermal shrinkage" (%) is a coefficient of thermal shrinkage of an outer diameter of a disk-form molded article having a thickness of 7 mm molded with a mold having an inner diameter of 65 mm, after sintering. The coefficient of thermal shrinkage of an outer diameter is calculated according to the following formula:

Coefficient of thermal shrinkage (%) =

[(inner diameter of mold (65 mm)) - (outer diameter of sintered disk (mm))/(inner diameter of mold (65 mm))] x 100